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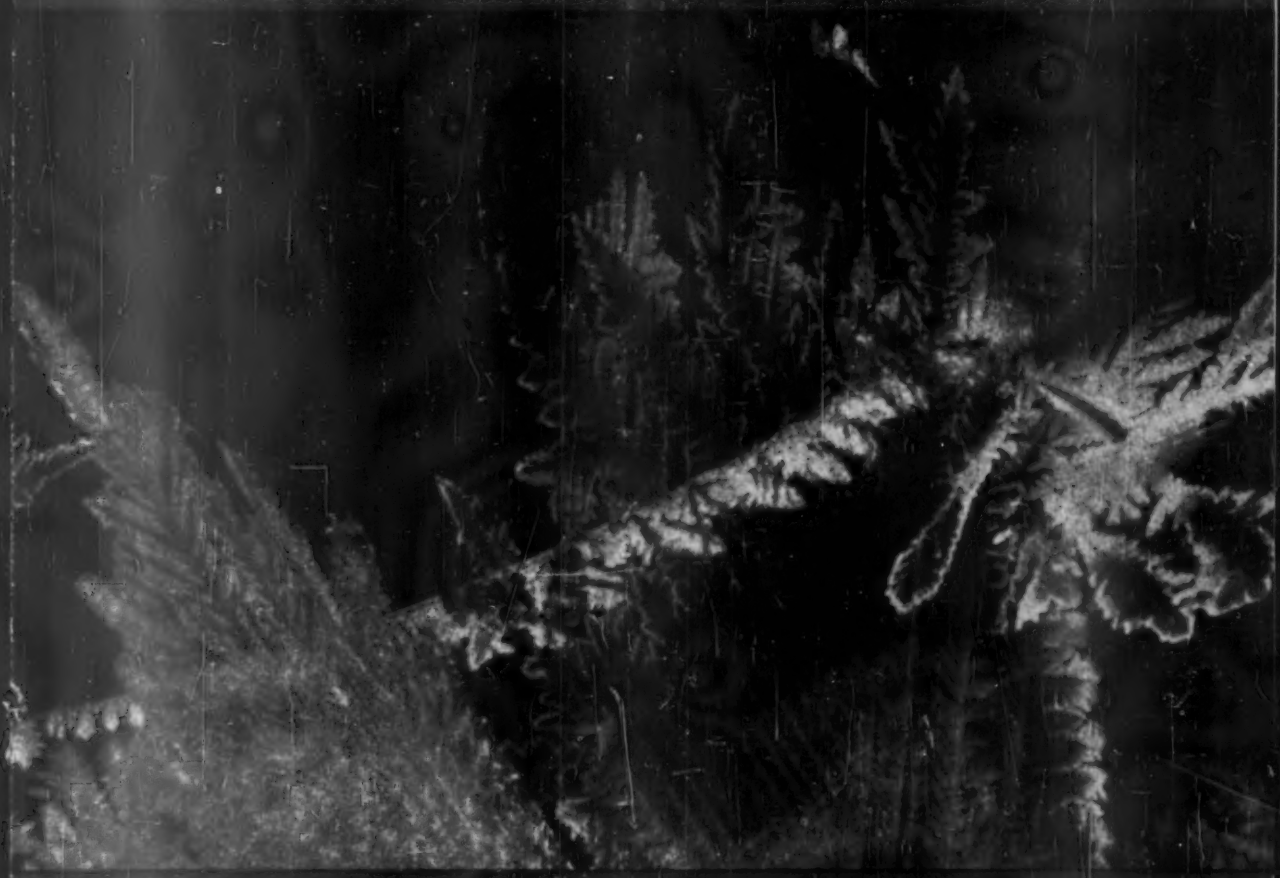

Ice Forms
See Page 6

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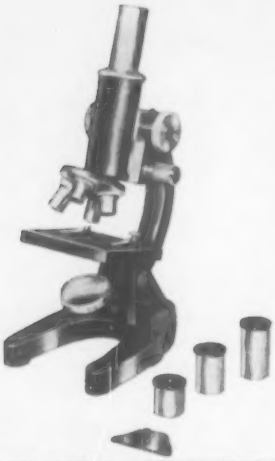

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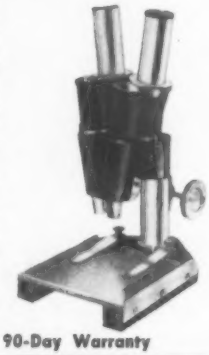

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GENERAL SCIENCE

Study Science Innovation

Progress in science depends on providing the scientist with the environment conducive to innovation, one that allows him the highest degree of individual freedom.

➤ CREATION of scientific knowledge and technique is a process that, unlike technologic development, cannot necessarily be hurried along by organizing it and enlarging its scope, Dr. Caryl P. Haskins, president of the Carnegie Institution of Washington, warns in his annual report.

Our society is likely to fail "to understand how rare and precious" is the process of scientific innovation although it has high respect for the fact of scientific progress, Dr. Haskins observes. Innovation is "rare and precious" and "essentially individual" in its nature.

"It is a terrible misconception to assume that the effectiveness of innovation, like that of production, can be doubled simply by doubling the scale of effort. Other and far more subtle elements are involved," Dr. Haskins reports. "One of these is the environment of the worker. Since innovation is and must always remain an individual experience, the investigator must be adequately shielded from the dangers to which he is exposed. His working environment must be unusually unconventional and malleable, with ready, yet penetratingly astringent, tolerance—and indeed welcome encouragement—for the long preliminary phase of apparently rambling and aimless effort that so often precedes the great discovery, while the ground is being canvassed and a mass of divergent material mastered and consolidated. Such an environment must allow the highest degree of individual freedom to the worker. It is of a very special kind, little susceptible of organization. It is best provided in our universities and our research institutes."

Among the reported highlights of research conducted by the Carnegie Institution of Washington were:

The age of the universe, now estimated at seven to 13 billion years, and its size have been increased markedly in the past decade of use of the 200-inch telescope on Mt. Palomar. (See SNL, Dec. 27, 1958, p. 403).

An electronic computer was used to process photoelectric astronomical observations, speeding by ten times the handling of the data.

Investigation of sources of radio waves from outer space showed that only a small fraction can be identified with optically observable objects.

The decline of the pre-Columbian Mayan City, Chichen Itza, was found to have occurred with the rise of another Mayan City, Mayapan.

The radio emission of the sun was studied with the result that active spots with radio output on 340 megacycles in small bursts of a second or less were discovered.

An intense band of electric current, the "electrojet" circulating in the upper atmosphere in the region of the earth's equator, was studied in relation to magnetic storms.

Explosions set off in open-pit copper mines in the South American Andes show that the crustal thickness there may be six to 12 miles greater than previously found in North America.

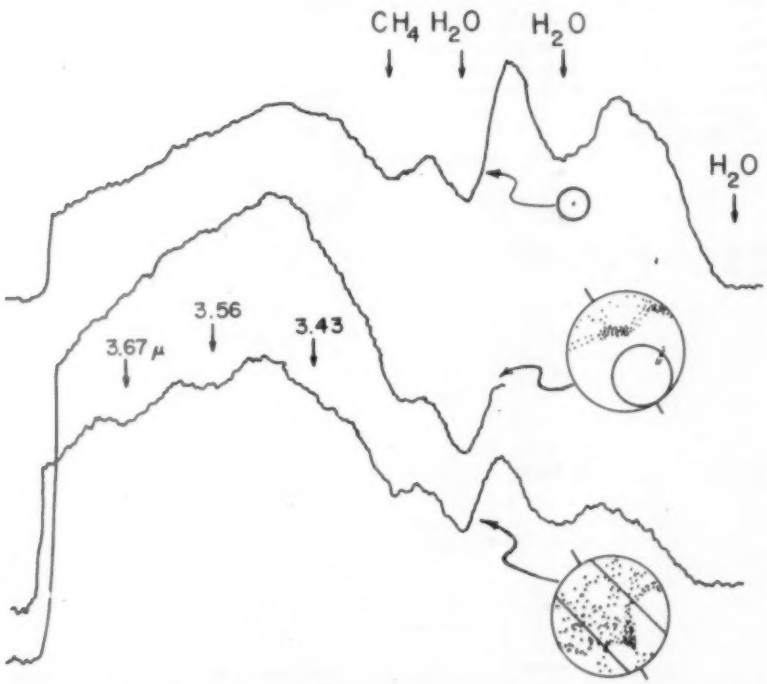
An apparatus that attains 65,000 times atmospheric pressure at a temperature of 1,100 degrees centigrade is being used to study minerals that might exist 80 miles below the earth's surface.

The methods of synthesis of proteins and nucleic acids in microorganisms were studied, and fine structures in living cells, including lipoprotein membranes and ribonucleoprotein particles of molecular weights of one to four million, were found essential in the synthesis of protein.

The amount of light required to form a molecule of chlorophyll in photosynthesis in the living plant was studied.

The mechanisms of heredity were studied in viruses and bacteriophages, leading to better understanding of the mechanism of the duplication of chromosomal material, the most fundamental of all properties of life because it controls the stream of inheritance.

Science News Letter, January 3, 1959



MARTIAN VEGETATION—The upper curve shows a spectrum of the sun. The depressions are caused by absorption by methane and water vapor within the earth's atmosphere. The middle curve is a spectrum of the desert area within the small circle projected on the diagram of Mars at the right and is similar to the solar spectrum. The lower curve is the spectrum of the area (including Syrtis Major) between parallel lines on the diagram of Mars at the right. It shows the absorptions due to organic molecules at the three wavelengths 3.43, 3.56, and 3.87 microns.

ASTRONOMY

Find Further Evidence For Life on Mars

➤ TESTS FOR the presence of large organic molecules, such as those in vegetation, confirm their existence chiefly in the dark regions of the planet Mars, Dr. William M. Sinton of Lowell Observatory, Flagstaff, Ariz., reported.

Improved equipment used in conjunction with the 200-inch Hale telescope at Mt. Wilson and Palomar Observatories made possible more sensitive absorption studies of the different regions, Dr. Sinton told the American Astronomical Society meeting in Gainesville, Fla.

"Growth of vegetation certainly seems the most logical explanation for the appearance of organic matter," he concluded.

Science News Letter, January 3, 1959

PSYCHOLOGY

Study Drug Uses

➤ SOLITARY confinement, one of the Communist techniques of "brainwashing," makes white mice and rats go "stir crazy."

These animals then make wonderful laboratory animals for testing drugs used to treat human psychotic and neurotic patients, Drs. R. C. Barnes and J. C. Munch of Hahnemann Medical College told the American Association for the Advancement of Science meeting in Washington. (See p. 5.)

The "brainwashed" mice become neurotic and show a very human-like sign of nervousness, a violent shake of the head when the back of the neck is touched unexpectedly. Some mice respond with a convulsive movement.

"Stir crazy" rats do not show such a head twitch but they make a senseless attack on anything placed in the cage such as a glass rod or pencil.

The tranquilizing drugs, such as reserpine, Thorazine and Miltown, were found to calm down the animals just as they do humans and the doctors were able to determine the dosage required to have a tranquilizing, anticonvulsant and sedating effect on the rats and mice.

Retarded Children

➤ A COMBINATION of tranquilizer and brain stimulant is giving hope for the improvement of severely retarded children.

The drug, serpatilin, was tried in a pilot study at Norwood School, Chevy Chase, Md., Miss Gertrude Jutison of the University of Maryland, reported to the AAAS.

The drug, which is about one-tenth tranquilizer and nine-tenths brain stimulant, seemed to work two ways. It made the dull, slow children more alert and calmed the hyperactive ones. In some children, it helped to improve speech; for others it bettered eye-hand coordination. For many, improved behavior resulted.

The research is under the direction of Dr. Ira Pearlman, Chevy Chase physician.

In another paper at the same meeting, scientists heard that no special techniques are needed for teaching reading to those who are handicapped because of brain injury. They are not different in perception and reading ability from other mentally handicapped individuals, Dr. Donald Y. Miller, coordinator of service for exceptional children in Arlington, Va., said.

It has been thought that brain-injured individuals have difficulty in learning to read because they are unable to see letters in the same way as the non-brain-injured and that therefore different techniques were needed for teaching them.

Dr. Miller reported research in New York State on two groups of 29 individuals each, one of which were brain-injured and the other handicapped because of heredity or familial reasons. Both groups were of young people from state institutions. No significant differences were found between the two groups.

Science News Letter, January 3, 1959

GEOPHYSICS

Earth's Magnetic Field

➤ A LARGE nuclear explosion could result in some permanent change in the earth's external magnetic field.

The energy released in the explosion of a 100 megaton nuclear bomb, about ten trillion trillion ergs, is approximately the same as the total energy contained in the earth's magnetic field from the surface outward into space. Therefore, Drs. E. P. Ney and P. J. Kellogg of the University of Minnesota suggest, a bomb exploded at heights above 100 miles in the atmosphere might have a distorting effect on the magnetic field.

Explosions at lower altitudes, Dr. Ney said, would probably have little effect on the field. The energy contained in the external magnetic field is only a small fraction of that contained within the earth itself.

The only "experiment" supporting this suggestion so far, Dr. Ney said, was the observation at Apia in the Pacific on Aug. 1, of a man-made aurora resulting from the Johnson Island explosion. Any large changes in the field caused by nuclear explosions could be measured from the ground.

Other geophysical effects of high-altitude nuclear bursts could include the temporary trapping of particles found in the Van Allen radiation belt. When released, these could produce an aurora.

The suggestion of Drs. Kellogg and Ney is reported in *Science* (Dec. 26). With Dr. J. R. Winckler, also of the University of Minnesota, they are preparing a further report on the geophysical effects of large nuclear explosions.

The report is one of the many results of the International Geophysical Year, which ended Dec. 31, made in the same issue of *Science*. Also reported is the discovery of the presence of lithium in the earth's high atmosphere. The element, reportedly used in hydrogen bombs, was not previously known to be present there.

Its presence at high altitudes could be related to nuclear tests carried out during the same period as the IGY program, which began July 1, 1957.

Among the other preliminary findings reported by Dr. Hugh Odishaw, executive director of the U. S. IGY program, are:

Measurements of the magnetic fields associated with sunspots revealed them to be as much as 8,000 times greater than at the earth's equator.

The intensity cycle for cosmic rays runs opposite to and somewhat behind the sunspot cycle.

The ozone layer and layers of the ionosphere that are created by solar radiation appear to persist during the long night despite the sun's absence.

Cosmic ray intensity at high altitudes has been found to be about the same in Arctic and Antarctic latitudes and more than four times intense there than at the equator.

An antipodal "echo" of the satellite signals, coming from the side of the earth opposite to the satellite, was discovered and is believed due to unexpected ducting of the signals by the ionosphere.

Science News Letter, January 3, 1959

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BIOLOGY

Nerve Cell Regeneration

➤ NERVE CELLS supposedly incapable of regeneration have been observed to divide.

"In the long view," Dr. Warren Andrew of Indiana University said, "this has a definite relationship to the restoration of nervous function in human beings."

In experiments conducted with mice there was a definite tendency for the nuclei in nerve cells and even the cell bodies to undergo division, Dr. Andrew said. He reported these findings at the American Association for the Advancement of Science meeting in Washington.

The left facial nerve, a typical motor nerve, was crushed in 20 mice whose ages were known to the day. The mice were divided into five groups of four animals each and then sacrificed at time intervals of one day, two days, 72 hours, one week and two weeks. In each case the nerve cells on the operated side were compared with the right or normal side.

Changes were slight in young animals, Dr. Andrew reported. However, in the one-week and two-week specimens from mice past middle age changes were more numerous.

As had been previously observed in nerve cells in very old animals, including human beings, there was a tendency for the nuclei and cell bodies to divide. This is in contrast to the long-held belief that nerve cells, with their extremely high degree of differentiation and specialization, are incapable of division after birth. The number of these cells was also supposed to remain constant except for the possible loss of some as a consequence of old age.

Very clear-cut figures of cells with two nuclei were seen on the operated side, with evidence of "double cells" connected only by a process similar to a dendrite, Dr. Andrew said.

Such "double cells," he believes, may well be a stage in actual new cell formation. While it is "difficult to arrive at an absolute conclusion" that there are two cells where there had been one, the experimental evidence points to this, Dr. Andrew said.

He showed scientists at the meeting slides in which a single cell with two nuclei could be seen, as well as slides of cells in the process of dividing and cells so close together that apparently they resulted from the division of one cell.

Dr. Andrew, who is chairman of the department of anatomy at Indiana's School of Medicine, explained that he has also observed the binucleated nerve cell in persons with some rare nervous diseases and in extreme old age.

Theobald Smith Award

➤ DR. ALBERT SJOERDSMA, head of the experimental therapeutics section of the National Heart Institute, Bethesda, Md., has been awarded the Theobald Smith Award presented at the AAAS meeting.

His research has been upon amine substances that influence blood vessels, the development of a test for a malignant tumor through its overproduction of serotonin, and enzyme-inhibiting compounds that open a new approach to the treatment of hypertension.

The Theobald Smith award, given by Eli Lilly and Company, is for scientists under 35 and it carries a bronze medal and $1,000.

Procter Science Prize

➤ DR. GUY SUITS, director of research at General Electric Company, was named recipient of the William Procter Prize for Scientific Achievement, awarded annually by the Scientific Research Society of America.

Presentation of the $1,000 prize was made in Washington on Dec. 29 during the AAAS meeting.

Dr. Suits had done significant work in the fields of non-linear electric circuits and high-temperature electric discharges. He holds more than 70 patents.

The prize honors the memory of the late Dr. Procter, who was instrumental in establishing the Society as a national organization. It goes to "a scientist or engineer in recognition of notable accomplishment in scientific research or in the administration of such research."

Science News Letter, January 3, 1959

MEDICINE

Tranquilizers Substituted For Hospitals in Haiti

➤ TRANQUILIZERS are often a superior alternative to hospitalization for the mentally ill.

Drug therapy is particularly advisable in those countries that economically cannot supply adequate mental hospital facilities, Dr. Nathan S. Kline, research director at Rockland State Hospital, Orangeburg, N.Y., told SCIENCE SERVICE.

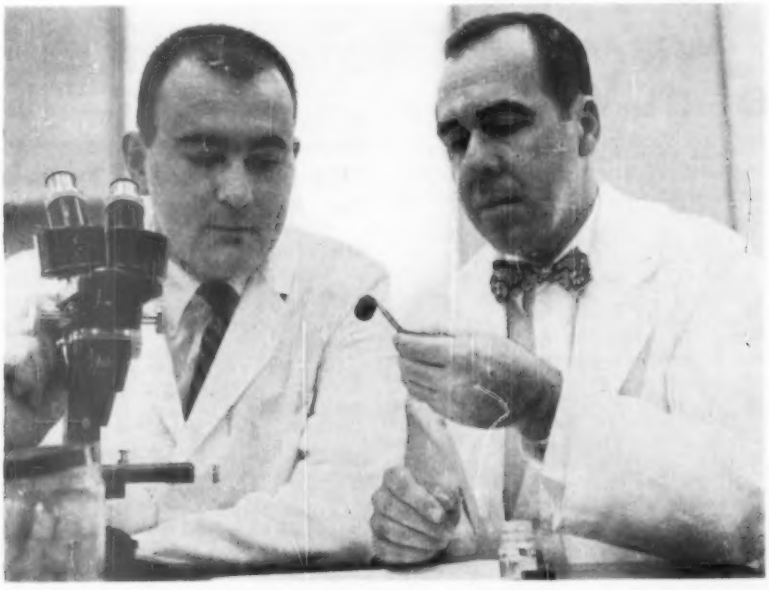
Currently, Dr. Kline has been working with the Government of Haiti to establish the Haiti Psychiatric Institute at Port-au-Prince. This hospital, which will begin operations in February, 1959, will offer primarily drug therapy for the estimated 6,000 to 9,000 mentally ill of Haiti. It is believed to be the world's first hospital to offer such treatment.

This means that by administering drugs, the mentally ill may be kept out of mental hospitals. The patient himself will feel that he is still an active member of his community instead of being shut off in a mental institution.

Economically, this type of therapy will offer a less expensive helping hand in those countries that cannot afford hospitals. Presently, a 1,000-bed hospital, plus services, costs $15,000,000, Dr. Kline pointed out.

The present program in Haiti is an attempt to establish whether tranquilizers can replace hospitalization of the mentally ill. Schering Corporation, Hoffmann-La-Roche, Inc., and Wyeth International, leading pharmaceutical companies, have donated the money for the clinic and are supplying the drugs, Dr. Kline reported.

Science News Letter, January 3, 1959



BIG TICK—Dr. George Anastos (right), professor of zoology at the University of Maryland, holds the largest known engorged tick, Amlyomma testudinarium, *as Dr. Carleton M. Clifford, research associate, looks on. The scientists are studying ticks and tick-borne diseases.*

GEOGRAPHY

Southeast Alaska Rises

Fifty-year-old benchmarks, sunk in bedrock along the Alaskan coast, indicate the southeastern part of the 49th state is rising.

➤ THERE HAS been another change in Alaska besides its political status. The southeastern part of the 49th state is rising, and the U.S. Coast and Geodetic Survey wants to know what is going on.

To find out, the Survey will dispatch next summer from Seattle a ship equipped with fine instruments and a crew of highly specialized men to probe reports from engineers in Alaska that sea level is not the same any more.

These reports asserts that benchmarks, which the Survey sank in bedrock 50 years ago, are now way off. Juneau is two feet higher than it is supposed to be, Skagway is up three feet, and Haines is up five.

Captained by Lt. Cmdr. Gerald L. Short, the Survey ship "Patton" will explore the inland waterway of southeast Alaska and visit 20 places where tide gauges were put in 50 years ago. Survey oceanographer H. B. Stewart said the men might make a study to determine, if possible, the center of the earth disturbance. In any event, the benchmarks will be corrected.

Dr. Stewart indicated there was no cause for Alaskans to become alarmed. The same thing is happening in the Great Lakes region, and the reverse is happening around Texas City, Texas, which has settled nearly three feet in 18 years.

In fact, he said, figures compiled by L. P. Disney of the Survey's tides and current division show that sea level along the Atlantic coast is rising about one foot in 100 years. Along the Pacific coast, it is rising about one-half foot in 100 years. The rising land in the Great Lakes and Scandinavian regions is attributed to a follow-through shifting of earth traced to the melting of ice of the Pleistocene period thousands of years ago.

"This may or may not be the case in Alaska," Dr. Stewart said. There are various forces at work in the earth called tectonic forces, which are most active in relatively young areas such as the Pacific coast, he said. These forces also may cause earthquakes like the recent rumble at San Francisco.

One of the places hardest hit by such geologic reshuffling is the U.S. Naval Base at Terminal Island, near Los Angeles. This base has sunk nearly 20 feet since 1937, when commercial oil drilling operations got underway. The Navy is understood to have spent several million dollars for a sea wall to stop the Pacific from scuttling its base. The Navy also has brought a damage suit against some of the 134 local oil companies which have 2,000 wells in the vicinity.

Science News Letter, January 3, 1959

ENGINEERING

"Flying Bicycle" in Works

➤ DESPITE jibes and ridicule, some leading British aviation scientists are planning to take a holiday from supersonic bombers and jet airliners to produce the basic flying machine that man has been striving to make through the centuries. They are working on a "flying bicycle," a plane powered by a propeller driven by the muscles of the men inside it.

They want to prove that Icarus was on the right path when, according to Greek mythology, he cemented wings to his body and attempted to fly toward the sun.

Beverley Shenstone, chief engineer of British European Airways, and one of the leaders of the team working on the project, described the project:

"We are approaching the problem in a sound technical manner and are taking it as seriously as the design of any powered aircraft. From what we have already learned, the outlook is certainly promising and the development will be quite cheap."

One of Mr. Shenstone's collaborators is Terry Nonweiler, a lecturer at Belfast University who is mainly responsible for the design of the manpowered flying machine.

"Once we have got over the problem of finance we could get the machine into the air in about six months or so," Mr. Nonweiler said.

"I am not going to say that eventually there will be such a machine in everybody's cycle shed," he said, "but it will open up a fascinating sport, once the machines are in production."

The big problem has been to determine just how much manpower will be needed for take-off and to maintain the "flying bicycle" in flight.

That is where Dr. W. R. Wilkie of University College Hospital in London, has been helpful. He has been working on this angle for some time, experimenting on the power that a man can produce, and for how long.

It is already known that a healthy man can generate one and a half horsepower with his arms and legs during a split-second burst of energy.

For a minute, a man in training can produce about four-fifths of one horsepower, but after that period it drops off and, for periods up to an hour in duration, the fittest man cannot maintain an output of more than one-half of one horsepower.

The enthusiasts are working on the idea that their flying bicycle will call for teamwork in the air, and they are trying to calculate whether only two or three men will be enough or if their machine will demand six or eight crewmen.

Science News Letter, January 3, 1959

GENERAL SCIENCE

Postmortem on 1958 Forecasts in Science

➤ THE SCIENCE forecast for 1958 made by Watson Davis, director of Science Service, and issued a year ago was fulfilled in many respects. (See p. 410.)

The possibility that a rocket would reach or circle the moon stated as "no 1958 certainty" did not happen, although two United States' attempts did send missile probes farther into space than anything that had previously left the earth.

Additional satellites were launched by both Soviet Russia and the United States as predicted. However, beginning attempts to join two satellites together for a rudimentary space platform are still in the future.

There were very high balloon flights, as predicted. There was important testing of ICBMs.

Radio astronomy was aided by the amplifying devices called masers.

Medical advances were not as important as hopefully predicted, although some fruitful research in 1958 may still come to light in 1959.

Federal support for science education was voted by Congress although the scholarship program anticipated was whittled down to loans for those who need them.

More youths than predicted engaged in science projects shown in science fairs, some half million of them, which constitute valuable training for future science careers.

Science News Letter, January 3, 1959

PHYSICS

"Ice Box" Forms Crystals For Scientific Study

See Front Cover

➤ AN "ICEBOX" that makes giant snowflake crystals two to four inches across from super-cooled water is helping scientists study metals.

The device, designed as part of the Harvard University's division of engineering and applied physics research program, supercools water several degrees below freezing. Freezing does not begin until the tank is "seeded" by a tube which is cooled to a very low temperature.

Crystals that form, such as the ones shown in the photograph on the cover of this week's SCIENCE NEWS LETTER, are called "dendritic crystals." They are similar to those formed when the supercooled liquid metal in a casting solidifies. Since crystal formation largely determines the strength and hardness of the metal, metallurgists are interested in the study.

Science News Letter, January 3, 1959

PHYSICS

Maser Works in "Heat"

Possible uses for the maser, microwave amplification by stimulated emission of radiation, have been extended since it can now be operated at "higher" temperatures.

➤ DISCOVERY that maser amplifiers can operate at a much "higher" temperature than previously known is reported by two British physicists.

In amplifying a weak signal, masers have the great advantage of adding very little background "noise," the equivalent for radio waves of the "snow" seen on television sets. The masers therefore can considerably extend the useful range of sensitive detecting equipment, such as radar or radio telescopes.

The finding that this new kind of microwave amplifier can be made to work at temperatures 60 degrees above zero on the absolute scale opens even more striking future uses for such devices than were expected. This is some 55 degrees higher than previous temperatures used with masers, although it is still mighty cold by usual standards, or about 350 degrees below zero Fahrenheit.

Drs. C. R. Ditchfield and P. A. Forrester of the Royal Radar Establishment, Great Malvern, England, report their discovery of this new action with a ruby maser in *Physical Review Letters* (Dec. 15) a publication of the American Physical Society.

They say the successful operation of a maser at 60 degrees absolute has a practical importance because the equipment needed to cool a material to this temperature is considerably simpler and less cumbersome than that required to cool it to near zero degrees absolute. Drs. Ditchfield and Forrester used liquid oxygen and nitrogen to cool their ruby specimen, whereas liquid helium is needed to reach temperatures near absolute zero.

The scientists emphasize that their results are preliminary, and they expect better performance of their maser device in the future using equipment designed specifically for the job.

Maser is a coined word, an acronym for microwave amplification by stimulated emission of radiation. In contrast with regular microwave amplifiers, which rely on electronic processes, the maser depends on the properties of molecules.

The first masers used beams of gas, such as ammonia, but more recently scientists have found that solids, such as the ruby used by Drs. Ditchfield and Forrester, are more satisfactory for many purposes. A ruby maser was used for the first time this year with the 50-foot antenna at the Naval Research Laboratory, Washington, and increased its sensitivity many times.

Science News Letter, January 3, 1959

GENERAL SCIENCE

USSR Science "Impressive"

With the growing importance of the role Russian scientists are playing in making administrative decisions, more emphasis should be placed on scientific exchanges.

➤ RUSSIAN SCIENTISTS are playing an important role in making administrative decisions in Government.

This fact, together with the average Russian scientist's ignorance about the United States and American science, gives an added importance to scientific exchanges between the two countries, Dr. Fred Cagle of Tulane University said.

Just returned from a 41-day trip through the U.S.S.R., Dr. Cagle said that it is now possible for American scientists to visit Russian laboratories and scientific institutions through the regular "In-Tourist" facilities. He covered some 14,000 miles, visiting and talking with more than 200 biologists. At some places Dr. Cagle, who is chairman of the zoology department at Tulane, was the first American scientist to visit.

"I am firmly convinced," he said, "that we have simple administrative devices for getting scientists into Russia."

Although, generally speaking, the Russians are about ten years behind us in biology, Dr. Cagle said, in some fields of the biological sciences their work is very impressive. In inventorying biological resources, such as taking stock of plant and animal life in unexplored areas, the Russians are doing excellent work.

Planning biological research is also conducted in a different manner than in the U.S., he said. For example, if Government officials decide to drain a swamp, scientists are first called in to set up a program. In this way basic research is often carried on preliminary to an applied science program.

We seem to have over-emphasized the influence Lysenko has had on Russian physiology and genetics, Dr. Cagle reported. This may be a result of our lack of information on Russian science since "we have been derelict in obtaining their publications." However, Pavlov remains a strong influence and may have hampered Russian science in physiology and behavior.

In conversations with the leading Russian biologists, Dr. Cagle found a great lack of information on how scientists worked in the U.S. and how their private laboratories and science institutions functioned.

Concerning the question of scientific freedom, Dr. Cagle said that leading scientists are apparently given complete freedom to study and research. However, the young scientist just graduated worked within a "dictated framework" until his superiors decide he is good enough to carry on independent research.

Dr. Cagle traveled as the official representative of the American Institute of Biological Sciences.

Science News Letter, January 3, 1959

PHYSIOLOGY

Study Fishes for Facts On Tooth Formation

➤ MOST FISH solve the problem of old, worn out teeth very simply: they replace older teeth by newly formed ones.

Some fish have teeth in their jaws, others such as the carp, goldfish and minnows, have a very efficient set of teeth in their throats, Prof. Howard E. Evans of the New York State Veterinary College said. Regardless of the type of tooth or fish, however, Prof. Evans reported, they are constantly being replaced.

Some fish show an alternate replacement similar to the firing of a five-cycle engine, 1-4-2-5-3. Others show a progressive replacement of 1-2-3-4-5, he told scientists at the vertebrate symposium of the American Society of Zoologists. The meeting is part of the American Association for the Advancement of Science.

There are many questions raised by the study of fish teeth which when answered will shed light on the mechanisms of tooth loss and formation in vertebrates, Prof. Evans concluded.

Science News Letter, January 3, 1959

BIOLOGY

Algae Studies Show Light Adds to Nuclear Volume

➤ "LIGHT-STRUCK" Euglena may explain how visible light helps radiation-damaged cells.

When grown at 95 degrees Fahrenheit, Euglena loses its chlorophyll, the pigment that makes it green. It also becomes distorted, enlarged and contains many nuclei instead of the usual one, Dr. J. A. Gross of Michigan State University reported.

Further tests showed, Dr. Gross explained in a paper read by title to scientists at the annual meeting of the AAAS, that light influences the proportion of cytoplasm to nucleus regardless of the temperature.

If the manufacture of nucleoprotein is stimulated by light in this organism, the same may be true in other cells, Dr. Gross concluded. It may explain why visible light induces recovery in cells previously exposed to ultraviolet radiations which are known to damage nucleoprotein materials.

Science News Letter, January 3, 1959

MEDICINE

3-Way Protection Cuts Radiation Fatalities

➤ A THREE-WAY protection against radiation death was reported to scientists attending the Second Australasian Conference on Radiobiology in Melbourne, Australia.

The death rate among mice exposed to radiation from gamma rays and fission neutrons was cut drastically by giving the animals cysteine, streptomycin and bone marrow cells, Dr. Howard H. Vogel Jr. of Argonne National Laboratory, Lemont, Ill., said.

The mice were exposed to single doses of irradiation high enough to kill 80% to 90% within 30 days. Daily streptomycin therapy reduced mortality for the first ten days, Dr. Vogel said. Intravenous injections of bone marrow cells within a few hours after exposure to fission neutrons did not protect against death for at least eight days.

However, combining the two treatments resulted in only 12% mortality among neutron-irradiated mice within the 30-day period. The same dose was lethal to 90% of untreated mice.

When the amino acid cysteine was injected into the mice prior to irradiation and both bone marrow and streptomycin were used, only seven percent of the mice died, Dr. Vogel said. In contrast, 98% of untreated irradiated mice died within ten days following exposure to the same supralethal dose of fission neutrons.

The number of unrecovered mice following the first dose, using 30 days as the lethality limit, indicates that an animal's chances of survival increase greatly with longer periods between two equal doses of fission neutrons.

Associated with Dr. Vogel in the studies were Donn L. Jordan, Dr. Samuel Lesher and Dr. Edward W. Daniels, all with the biological and medical research division at Argonne.

Science News Letter, January 3, 1959

METEOROLOGY

Study Meteor Dust in Increases of Rainfall

➤ THE QUESTIONS of whether rainfall can be increased by meteor dust sifting down through the earth's atmosphere is being investigated by U. S. and Australian scientists.

New evidence that the dusty trails of comets through which the earth passes can increase rainfall 30 days later was reported to the National Science Foundation by an Australian scientist. Dr. E. G. Bowen, chief of the radiophysics division, Commonwealth Scientific and Industrial Research Organization, Sydney, Australia, said the finding could give weathermen a new tool for more accurate rainfall prediction.

With his colleagues, he has found that rainfall in January tends to be abnormally high about the 12th, 21st and 31st of each year.

U. S. scientists have also found such peaks at about these same dates in January. When the numbers of freezing nuclei in the atmosphere were measured for February and March, however, they could not find any association with meteor streams a month earlier.

Drs. Dwight B. Kline and Glenn W. Brier of the U. S. Weather Bureau found, instead, that the freezing-nuclei peaks seem to be related to solar radio bursts. These are powerful discharges of energy from the sun that are detected by sensitive radio receivers operating in the radar frequency range.

One possible source of the freezing nuclei and the rainfall peaks associated with high nuclei counts is dust from the earth.

Cloud physicists believe that freezing nuclei are one of nature's methods of forming ice crystals that then fall on the ground as rain when temperatures in the atmosphere's low layers are warm enough.

Drs. Kline and Brier made their observations on freezing nuclei in a Washington suburb. They used a cloud chamber, or refrigerated container, to form the ice crystals, then let the crystals grow in a sugar solution in order to count them.

Science News Letter, January 3, 1959

MEDICINE

Heredity, M-S Link Twin Studies Indicate

➤ A NEW STUDY of twins links heredity as a possible cause of multiple sclerosis.

Heredity has long been under investigation as a possible factor in the cause of this disease of the central nervous system. Now, the results of a study of twins suffering from multiple sclerosis are reported in the *Archives of Neurology and Psychiatry* (Dec.).

Drs. Roland P. Mackay and Ntinos C. Myrianthopoulos of the University of Illinois College of Medicine studied both identical and non-identical twins.

Among identical twins, both members of two sets definitely had multiple sclerosis, both of five sets apparently had it, and only one member of each of 22 sets was afflicted.

Among non-identical twins, both members of one set had the disease; both apparently had it in three sets, and one member each in 21 sets definitely had the disease, the scientists reported.

Some of the twins exhibit partial symptoms. These symptoms may flower into the full clinical picture, while other twins now free may develop the disease.

Yet, it seems highly unlikely that multiple sclerosis is caused by a genetic factor alone, the scientists caution. Thus it is possible that a genetic factor may require the addition of an environmental agent before the disease can develop. When one of a set of twins does not develop the disease, it may be due to the fact that one of the pair has not yet encountered the unidentified environmental factor.

Multiple sclerosis was from 20 to 33 times as prevalent in more than 1,000 relatives of the twins studied as in the general population. Currently, more than 500,000 persons suffer from this and related diseases.

Science News Letter, January 3, 1959

IN SCIEN

ELECTRONICS

Computer Composes For String Quartet

➤ AN ORIGINAL four-movement piece of music called the "Illiac Suite for String Quartet" has been composed by a high-speed digital computer at the University of Illinois.

The suite is the result of an experiment aimed at showing how electronic "brains" can contribute to creative arts.

Recorded excerpts were played by Dr. Lejaren Hiller, assistant professor of music at the University of Illinois, for scientists attending an American Association for the Advancement of Science meeting.

Dr. Hiller said the process of musical composition involves a series of choices of musical elements from an endless variety of possibilities. Musical composition by robot depends heavily upon input instructions, he said. Factors not specifically accounted for are left entirely to chance.

Musical composition by robot is not an expression of the machine's soul, but, instead, as Dr. Hiller put it, "the extraction of order out of a chaotic environment."

For computer composition, random integers (whole numbers, not fractions) are made the equivalent of notes, rhythmic beats, and other musical elements. These are then worked over mathematically to express rules of composition, and are fed into the machine.

Science News Letter, January 3, 1959

PSYCHIATRY

Child Murderers Do Not Need Much Provocation

➤ CHILDREN commit murder in the United States without much provocation, Dr. Melitta Schmideberg, New York psychiatrist, told the meeting of the American Association for the Advancement of Science.

Each society has the crimes it creates, condones or fails to nip in the bud, she said. Our society is a child-dominated society. In other, parent-dominated, societies, parents often commit crimes against their children, commit infanticide, brutality, incest, and, in some Eastern countries, sell their children into prostitution.

Normal people, pointed out Dr. Schmideberg, assume as a matter of course that to take a life is such a terrible thing that the murderer must be deeply abnormal or carried away by an irresistible impulse. This is not necessarily so, she said; sometimes to him the other person's life is just cheap. Murder does not seem such a big thing; hence he needs little provocation and has little reaction of guilt or remorse. He is so highly self-centered that he regards every hurt as a lese majesty that justifies every and any type of retaliation.

Science News Letter, January 3, 1959

CE FIELDS

ROCKETS AND MISSILES

NASA Accepts Bid for High-Thrust Engine

➤ A ROCKET engine with "far more thrust than any other rocket now in existence" will soon be under development, the National Aeronautics and Space Administration has reported.

The engine will be used to launch space payloads weighing as much as several tons. It will be designed and developed for NASA by Rocketdyne, a division of North American Aviation, Inc., Canoga Park, Calif.

Rocketdyne was selected from among six companies submitting proposals in the NASA competition for the project calling for an engine in the 1,000,000- to 1,500,000-pound thrust class. T. Keith Glennan, NASA Administrator, said the selection was based on careful assessment of the technical value of the proposal, and of the facilities, experience and other qualifications of the company.

The engine will be a liquid bi-propellant, single-chamber, booster rocket. It will use liquid oxygen and hydrocarbon propellants but will be designed to use other liquids without major change. Performance flight rating tests of the engine will be based on unmanned vehicle applications although the engine may eventually propel manned satellites and space craft.

The original design will provide a 1,000,000-pound thrust, but will be capable of being developed for delivery of 50% more.

NASA's long-term big engine program may require a period of from four to six years to bring it to useful completion, Mr. Glennan said. The program includes use of Government facilities and test stands to be constructed at Edwards Air Force Base, California, in addition to the engine development. It also includes Government-furnished fuel for testing components as they are developed and is expected to cost in excess of $200,000,000.

Science News Letter, January 3, 1959

AGRICULTURE

Propose Nuclear Reactor To Sterilize Farm Land

➤ TWO SCIENTISTS at the University of California at Los Angeles have proposed a portable nuclear reactor for sterilizing agricultural land.

Drs. Samuel G. Wildman and Amos Norman told the American Nuclear Society meeting in Detroit that such a reactor may prove to be a practical, economical means of treating soil prior to planting.

Gamma rays and neutrons from the reactor bombarding the soil would kill and prevent reproduction of such parasites as nematodes, fungi and insects which afflict crop plants and reduce yields, they said, as well as prevent the germination of weed seeds.

They said that since the portable reactor would be operating (probably by remote control) in relatively unpopulated areas, unwieldy shielding could be reduced substantially.

Thus it would probably be of much simpler design than stationary ones. Any radioactivity induced in the soil would be short-lived enough not to constitute a hazard either in the soil or in crops grown in it.

The portable reactor should be designed to move at about six or seven miles per hour, irradiating 100 square feet of soil per second to a depth of six inches.

The UCLA scientists estimated that the reactor could be designed to be used in field treatment at a cost of approximately $70 an acre. Compared to the present $300 to $500 per acre it costs for chemical sterilization, the economic advantages are obvious.

Science News Letter, January 3, 1959

ROCKETS AND MISSILES

Rocket Trip Indicates Man Can Survive

➤ MILITARY scientists have indicated that man can live in the same weightless condition as that experienced by Little Old Reliable, the monkey rocketed into space Dec. 13.

Although the monkey was not recovered, data transmitted by radio throughout the entire flight has led scientists to term the experiment "98% successful."

Capt. Norman L. Barr, director of the aeronautics division of the Navy's Bureau of Medicine and Surgery, said it is still too early to draw full scientific conclusions from the experiment.

The monkey's heart rate, blood pressure, respiration, temperature, breath sound and body-motion sound were measured during the 13-minute space flight.

For almost nine minutes, the monkey was in a weightless state and showed no adverse physical change, said Capt. Barr. In fact, the irregular respiratory and heart rates experienced during acceleration returned to normal as it entered the weightless state.

Capt. Barr and Col. Robert H. Holmes, chief of the biophysics and aeronautics research branch of the Army's Medical Service's Research and Development Command, said the South American squirrel monkey had been trained for four to six weeks and had been placed in the capsule several times before the actual launching. Observations were made for about 30 minutes with the monkey in position before he was sent aloft.

Problems connected with the internal environment of the capsule, said the two scientists, involved the removal of carbon dioxide and the supply of oxygen. A still newer difficulty was the maintenance of a constant temperature. The capsule in the launching contained a small seven-watt light bulb to help keep the monkey warm, said Col. Holmes.

Science News Letter, January 3, 1959

PSYCHIATRY

Schizophrenic Children May Not Show Pain

➤ WHEN CHILDREN with the mental disease schizophrenia are hurt or injured, the majority do not react to pain as the normal child does.

This fact is reported by Dr. William Goldfarb of the Henry Ittleson Center for Child Research, New York, to the *American Journal of Orthopsychiatry*. (Oct.). Of a group of 31 schizophrenic children observed, he reported, only six were not abnormal in reaction to pain. He cited these examples:

Alice caught her finger in the door. The tip was cut and the finger was swollen and blue. She did not cry. Later she looked smilingly at the finger with no report of pain.

Jane was found sitting on a hot radiator with no apparent awareness of the heat. The teacher found the radiator so hot she could not keep her hand on it.

Jill smacked Alice loudly on the right cheek. When asked where Jill had hit her, Alice pointed uncertainly to her left cheek.

Of the 31 schizophrenic children, seven were found to injure themselves. Some of these were driven not so much by aggression against themselves as confusion between their own bodies and the outer world.

Benny liked to cut any available material with scissors. One day he was found cutting the palm of his left hand until he had produced a bleeding gash.

Science News Letter, January 3, 1959

BIOCHEMISTRY

Boron Drugs May Penetrate Brain Barrier

➤ THE POTENCY of boron compounds that might provide scientists with a selective brain tumor killer can be measured by their solubility in benzene.

Increased solubility in a lipid solvent is an important measure of the penetration of the brain by a drug, Dr. A. H. Soloway of the department of neurosurgery, Massachusetts General Hospital, Boston, reports in *Science* (Dec. 19).

The "neutron capture therapy" of nerve cell tumors has given scientists the possibility of destroying only diseased cells without harmfully affecting adjoining normal cells. When boron-10 captures a slow neutron part of the large amount of energy liberated is shared by an alpha particle.

This alpha particle is then propelled about 0.00035 inch, or nine microns, through the brain tissue so that the radiation effects are confined to a small region, the part of the cell, usually diseased, containing the capturing boron atom.

Boron compounds that show the greatest effects on the central nervous system and greater concentration in the normal brain relative to tumor do concentrate more in the lipid solvent benzene, Dr. Soloway suggests.

Science News Letter, January 3, 1959

GENERAL SCIENCE

Science Forecast for 1959

An anti-cancer drug would be the greatest 1959 achievement but missile-men still eye moon and planets as targets for man's geographical aggression.

By WATSON DAVIS

➤ FOR HUMAN beings on earth, the top science achievement of 1959 may be the development of a chemotherapeutic drug that will check some forms of cancer.

For the future men in space, rocket probes carrying instruments, not men, may in 1959 reach beyond the moon, possibly even to the vicinities of Mars and Venus. (See p. 6.)

Such diverse potential achievements, forecast for the coming year, emphasize the vast sweep of scientific and technological advance and the onward rush of progress.

Control of cancer, along with prevention of heart and circulatory disorders that cause such high death rates, are prime medical targets. The achievement of substantial progress may not come in the next few months, but there is always the possibility of a breakthrough, translatable in the near future to actual application to human sufferers.

Screening tests for malignancies, comparable to the tests for other diseases like tuberculosis, may be the first step, possibly to be taken in 1959, toward more cancer control. Such screening would be necessary in picking those who should receive an anti-cancer drug.

Antibiotics to Come

Medically, there may be development of new antibiotics effective against some of the resistant disease organisms that have arisen to check the control of various infectious diseases that seemingly had been conquered. The staphylococcus infections that have been endemic in hospitals, killing many newborn, are "bad actor" germs in this regard and the intensive developmental antibiotic rush in drug house laboratories now in progress may pay off.

The drug plasmin, already successfully used, will undoubtedly be applied to a wider variety of vascular diseases.

Medical advances promise more good to humanity (provided rockets and missiles are not let loose to cause world-wide destruction) than continued space exploration. However, rockets both into space and between continents may continue to receive more public attention and headlines.

The moon, or its vicinity, will still be a prime missile target for the sake of knowing what is to be encountered in outer space.

The idea of actually hitting the moon is being played down, both because of the difficulty of guidance required and the fear that dirty objects from earth would contaminate this natural satellite of the earth. There is even fear that a direct lunar hit would set off a chemical explosion on the moon due to electronically unfulfilled atoms in its make-up.

The next step in satellite development, joining two space vehicles in orbits as space platforms, may be attempted, but it may take some years before this can be done. There may also be more urgent jobs to be done in space near the earth, such as sending up television relay satellites or orbiting space craft that will observe what is happening on parts of the earth unobservable directly.

The space probes toward Mars and Venus may not be successful in 1959 although they may be attempted. But every kind of rocket or missile experiment, such as are undertaken to hurl potential hydrogen bombs to distant corners of the earth, is progress toward the conquest of space.

Engineers and medical experts will continue to work toward the colonization of space and other bodies of the solar system, but it is far too much to expect this to happen within a few decades, much less a year. The problems are much greater than visualized by the science fiction writers.

Certainly there will be more intercontinental ballistic missiles fired successfully in the race with the USSR to dominate the earth with threat of atomic retaliation.

The radiation belt around the earth discovered as the result of information from satellites of 1958 will be investigated intensively because of its bearing on future space travel and because we want to know about this unsuspected phenomenon. The nature and origin of the particles in the belt will be probed. Are they partly protons, and, if so, at what energies? Theories as to their origin will probably be clarified. There is also indefiniteness about the extent of the radiation belt. This will require more satellites, which will be launched, crammed with beeping instruments.

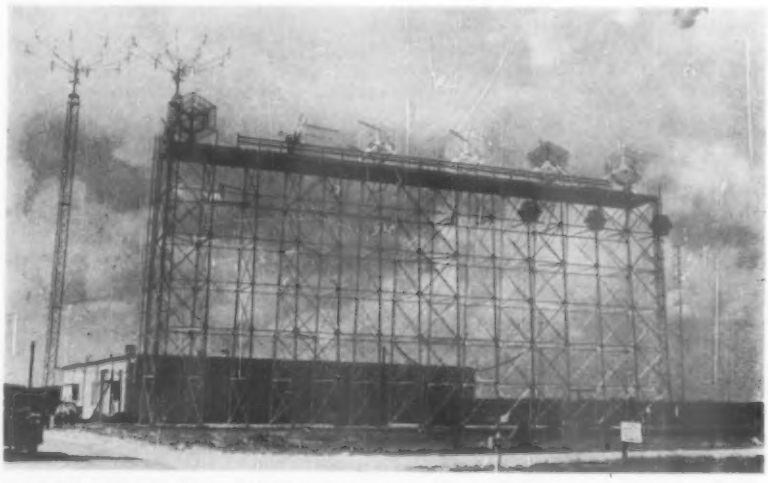
Very high altitude balloon flights will also observe the space above the earth, for a variety of purposes. There is a puzzle as to whether light chemical elements, such as lithium, beryllium and boron, are a part of the primary cosmic radiation from outer space. Instruments aboard balloons may give a solution.

It is suspected that high energy neutrons arrive from the sun at the top of the atmosphere and attempts will be made to detect them.

In addition to astronomical observations from balloons and satellites, major advances in improving the effectiveness of land-based telescopes are imminent. A practical electronic image tube is expected to be in operation on the Lick Observatory 120-inch reflector by late 1959 or early 1960. This will increase the effectiveness of the telescope for some purposes by a factor of from ten to 100.

New Radio Telescope

Observations of the heavens by the radio waves received from outer space will be increased with the inauguration of observations by the National Radio Astronomy Observatory 85-foot radio telescope. With a traveling wave tube receiver of novel design most of the planets in our solar system will be measured for reliable planetary temperatures. The Naval Research Laboratory radio telescope will conduct a careful search for



MOON PROBE TRACKERS—Telemetry tracking units at Cape Canaveral, Fla., used for following the path taken by U. S. Air Force artificial satellites in man's scientific probes of space, form a delicate pattern against the sky.

hydrogen atoms in intergalactic space.

Because there has been increasing evidence that the stellar material of the universe is less uniform than hitherto believed, there will be search to determine whether stars differ from galaxy to galaxy.

Mars will be attacked by radar, bouncing radio echoes from that planet as has been done previously with the moon. The ruddy planet will also be observed by spectrograph and photometer.

Just as a whole new universe was opened a decade or so ago by observations of radio waves from the far reaches of space, so new outlines of the universe are likely to be shown by a new experimental field, gamma ray astronomy, consisting of observations of natural, very short radiations from space.

The world-wide exploration of the earth and the space around it, accelerated in the International Geophysical Year just ended, will continue into 1959. One of the results will be the determination of the structure of the land mass under the Antarctic continental ice.

Jet Planes Flying

In the field of aviation, there will be a score or more jet planes in operation, both across the continent and across oceans. The first steps toward still faster planes, condensing space and time still further, will be taken in flight research of the X-15 plane that will be test flown almost at the top of the atmosphere.

Atomic-powered planes will come closer to reality, if the Soviets have not already flown one, but the next great step in flight propulsion will probably be the use of chemical fuels in jets.

In understanding of the constitution of living matter, and incidentally of disease-causing entities, the exploration of constituents of protein will continue, bringing us closer to the chemical mystery of life itself.

How man arose on the earth may be better understood through discovery in 1959 of skeletal remains in the Near East or Mediterranean regions that will illuminate the relationship between the heavy-browed Neanderthalers and true Homo Sapiens, or modern man. Italian archaeologists will pick out of coal the recently-found complete skeleton of Oreopithecus and determine whether this early creature was related to man or the great apes.

Scientific Hopes

While interested in the past of primate life, man will continue to be apprehensive of the future, despite the vast advances in science and technology and the implementation of scientific education, research and development that will be accelerated in 1959. Federal programs born of the fear of Russia's sputnik will come to financial fruition in 1959 while the accelerating interest and understanding of science for youth, in and out of schools, will blossom even more than in the past.

Science News Letter, January 3, 1959

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4¼" ASTRONOMICAL TELESCOPE up to 270X!

Mt. Palomar type. Up to 270 Power. A fine Reflector Telescope complete with real Equatorial Mount and Tripod and 6X Finder. Aluminum tube, 4¼" dia. mirror, rack and pinion focusing eye-piece holder, 2 eyepieces and mounted Barlow Lens for 40X, 90X, 120X and 270X. Low cost accessory eyepiece available for higher powers. Shipping wt. approx. 25 lbs.

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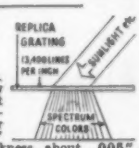

It's here—after decades of effort. Replica Grating—on film—at very low price. Breaks up white light into full spectrum colors. An exciting display. 13,400 lines per inch, running long way on film 8" wide—grating area 7½". Thickness about .005". Dispersion about 24°. Use it for making spectroscopes, for experiments, as a fascinating novelty. First time available such large size—so cheaply. Comes in clear plastic protector.

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A precision-made 45 power reflecting telescope—by the makers of Spitz Planetarium. Clearly reveals the craters of the moon, shows Saturn, Jupiter, other wonders of the heavens. Based on same principles as world's giant telescopes. Stands 36" high on removable legs. Adjustable 3" polished and corrected mirror. Fork type Alt-Azimuth rotates on full 360° circle—swings to any location in the sky. Fascinating 18-page instruction book is included. Instrument packed in sturdy carrying case.

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Precision made tweezer with built-in magnifying lens. Optical ground glass, adjustable to working distance. German import exceptionally well made. Stainless steel, highly plated, strong points, length 4¾". Ideal for dissecting, examining small specimens. Nice leather case for field trips. Full money back guarantee, postpaid. $5.00. CAP'N BALL, Dept. SL-2, Box 2266, Palm Beach, Fla.

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This inspirational book, *now in its well-merited 8th printing*, has helped thousands to live more wisely, more fully, more happily, more effectively—in the best sense, more profitably; for a thorough understanding of self is the very bedrock foundation on which to build for peace of mind and sound mental health.

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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

APPLICATION OF ATOMIC ENGINES IN AVIATION—G. N. Nesterenko, A. I. Sobolev, and Yu. N. Sushkov, in English translation—*Technical Document Liaison Office (Office of Technical Services)*, 184 p., illus., paper, $3. Originally published by the Military Press of the Ministry of Defense of the USSR, Moscow, 1957.

ATOMIC ENERGY: Glossary of Technical Terms—U. N. Terminology Section—*United Nations (Columbia Univ. Press)*, 215 p., paper, $4. Atomic energy terms in English, French, Spanish and Russian.

BASIC ORGANIC CHEMISTRY—Louis F. Fieser and Mary Fieser—*Heath*, 369 p., illus., $6. Organic chemistry textbook adaptable to a short course.

THE CHEMICAL ELEMENTS—Philip S. Chen—*Chemical Elements Co.* (South Lancaster, Mass.), rev. ed., chart 36x48 inches, $1. Gives all data on the elements, their derivation, discovery, isotopes, occurence, preparation, uses, production and distribution.

COLD INJURY—M. Irene Ferrer, Ed.—*Macy*, 341 p., illus., $5.95. Transactions of the Fifth Conference, 1957, at Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska.

THE ENDOCRINOLOGY OF REPRODUCTION—Joseph Thomas Velardo, Ed.—*Oxford Univ. Press*, 340 p., illus., $15. A textbook on the action of the hormones on the physiology of the reproductive organs. Extensive bibliographies included.

AN INTRODUCTION TO ELECTRONIC THEORIES OF ORGANIC CHEMISTRY—G. I. Brown—*Longmans*, 209 p., illus., $3. Introduction to the theories which can be understood by any student with knowledge of the simpler facts of organic chemistry.

MAKING THE MOST OF YOUR YEARS—Evelyn Hart—*Public Affairs Committee*, Public Affairs Pamphlet No. 276, 28 p., illus., paper, 25¢. Advice on how to age happily.

MINNESOTA'S CHANGING GEOGRAPHY—John R. Borchert—*Univ. of Minn. Press*, 191 p., illus., $4.25. To help Minnesota's young people understand and interpret the varied landscapes of the state.

OPERATIONS RESEARCH FOR INDUSTRIAL MANAGEMENT—Dimitris N. Chorafas—*Reinhold*, 303 p., $8.75. Simulation studies and the use of electronic computers in executive decision making.

ORIGIN OF PRIMARY EXTRAXYLARY STEM FIBERS IN DICOTYLEDONS—Amelie Blyth—*Univ. of Calif. Press*, 90 p., illus., paper, $2.

PHYSICAL SCIENCE FOR PROGRESS—Milton O. Pella and Aubrey G. Wood—*Prentice-Hall*, 515 p., illus., $4.80. The principles of physics, chemistry, astronomy and physical geography, for a general high school course.

PHYSICS OF METEOR FLIGHT IN THE ATMOSPHERE—Ernst J. Opik—*Interscience*, 174 p., illus., $3.85, paper $1.95. Covers the phenomena occurring during the flight of a meteor through the terrestrial atmosphere.

RICHARD BYRD: Boy Who Braved the Unknown—Guernsey Van Riper, Jr.—*Bobbs-Merrill*, 189 p., illus., by Aubrey Combs, $1.95. Childhood of a famous explorer, for young readers.

SEA SHELLS OF TROPICAL WEST AMERICA: Marine Mollusks from Lower California to Columbia—A. Myra Keen—*Stanford Univ. Press*, 624 p., 1,500 illus., $12.50. Combines some of the scholarliness of a check list with the aspects of a popular handbook for the entire region.

SINGER SCIENCE DISCOVERIES—G. W. Frasier, Helen D. MacCracken and D. G. Decker—*Singer*, 288 p., illus. by Guy Brown Wiser, $2.72. Fourth grade.

SINGER SCIENCE EXPERIMENTS—G. W. Frasier, Helen D. MacCracken and D. G. Decker—*Singer*, 320 p., illus. by Guy Brown Wiser, $2.84. Fifth grade.

SINGER SCIENCE PROBLEMS—G. W. Frasier, Helen D. MacCracken and D. G. Decker—*Singer*, 352 p., illus. by Guy Brown Wiser, $2.96. Sixth grade.

TEN STEPS INTO SPACE—I. M. Levitt, Willy Ley and others—*The Franklin Institute*—202 p., illus., paper $4. Monograph contains series of lectures on space propulsion, satellite instrumentation, celestial mechanics, orbits and actual and future satellites.

TOOLS FOR MACHINE LITERATURE SEARCHING—J. W. Perry and Allen Kent with Semantic Code Dictionary, Equipment and Procedures—*Interscience*, 972 p., $27.50. Contains tabulation of words with their codes in machine language and also the reverse tabulation, to permit finding the meaning of any code.

Science News Letter, January 3, 1959

TV & RADIO TUBE TESTER

SAVE MONEY — TIME And Your Patience

This remarkable item tests filaments of TV, Radio and picture tubes. It also tests many electrical appliances. Easy, safe to use. Insert tube in socket. Test lite instantly indicates if tube is good. Lifetime metal case. AC or DC.

$4.95
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Questions

BIOLOGY—How do the nerves of young and extremely old animals differ? p. 5.

GENERAL SCIENCE—What are three important research projects reported by the Carnegie Institution of Washington? p. 3.

GEOPHYSICS—What element has been discovered in the earth's high atmosphere? p. 4.

PHYSICS—At how high a temperature can masers operate? p. 7.

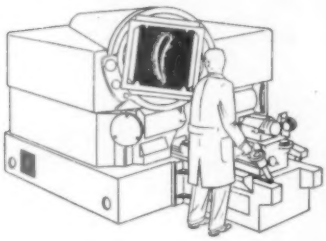
Photographs: Cover, Harvard University; p. 3, William M. Sinton; p. 5, University of Maryland; p. 10, U.S. Air Force; p. 16, Milwaukee Dustless Brush Co.

Kodak reports on:

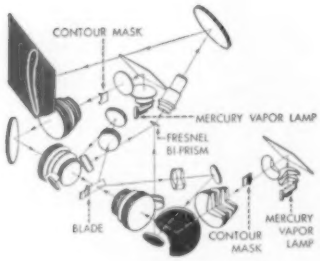
a large optical device . . . what happened on August 22, 1946 . . . tocopherol, three years and 1384 papers later

For blades (also vanes and buckets)

This is a blade from a jet engine. Many mathematical minds, mighty mathematical machines, and much aerodynamical experimentation have created its shape. Violation of the plan to the extent of a few thousandths of an inch in a single cross-section of a single blade sucks at efficiency like a little leech. And there are so many blades in a single compressor or turbine that the total number of them made in the brief span of air-breathing non-reciprocating history must compare with all the wooden spokes in all the wagon wheels of all the supply trains in all armies since Alexander the Great. Tolerances on wooden spokes have always been broad.



Therefore we have been busy lately building this large optical device. It works as follows:



Not long ago the two mercury lamps were turned on and the first cross-section of the first blade was seen in magnification against its tolerance envelope scribed on the screen. Inspection from now on should go well.

The device has been named Kodak Section-Profile Projector. *It is enough to restore faith in the future of geometrical optics. Inquiries go to Eastman Kodak Company, Special Products Sales, Rochester 4, N. Y.*

Photoplast plates

Rohm & Haas and we are putting on a little promotion. They are the people who make optically clear methyl methacrylate sheets under the trademark "Plexiglas." We are the people who try to make the world's most dependable photographic emulsions under the trademark "Kodak."

The promotion draws attention to the result of coating one of our emulsions on their methacrylate to produce *Kodak Photoplast Plates*. The plates went officially on sale on August 22, 1946. You could have placed an order for them the next morning if you had known about them and wanted some. No special reason for delaying the promotion till now. The matter just hadn't struck us as urgent until Rohm & Haas phoned us about it the other day. Ever eager to see "Plexiglas" moving along the arteries of trade with or without photographic emulsion on it, R & H wanted to tell their field sales force about *Photoplast Plates*.

Then, even before we got around to deciding that this would be fine with us, came another phone call about *Photoplast Plates* from one of the smarter firms in the electronics business. Originally they had inquired about circular glass plates which would accept photographically a fine-detail pattern. Link by link, the chain of correspondence had led up to *Photoplast Plates*. They can resolve better than 200 lines per millimeter, machine beautifully in broad daylight after exposure and processing, are easy to cement with recommended solvents and are easy on the nerves of artisans and engineers afflicted with slippery fingers. The electronics executive on the phone was beside himself with enthusiasm at the analog-to-digital code wheels he had fabricated with them. He was also popping with ideas for putting computer programs on them in optical form. Whether he was going to read the programs with multiple arrays of tiny *Kodak Ektron Detectors* he didn't say.

Very well. We hereby advertise (and Rohm & Haas salesmen are free to disclose) that Kodak Photoplast Plates *are for sale in any desired rectangular size from 4" x 5" to 20" x 24" and in thicknesses of 1/16", 1/8", and 1/4". Prices and technical details on application to Eastman Kodak Company, Special Sensitized Products Division, Rochester 4, N. Y.*

The wordy vitamin

In the three years 1955 through 1957, there have appeared to our knowledge 119 papers in the world's scientific literature on the occurrence and distribution of vitamin E, 60 on the determination of vitamin E, 148 on its chemistry, 362 on its relation to physiology and pathology, 85 on its pharmacology, 275 on its role in nutrition and metabolism, and 335 on its medical and therapeutic uses. There has been an international congress on vitamin E in Venice, and the vitamin has been definitely related to the hatchability of turkey eggs, with weighty consequences for turkey economics.

Because we like to think of ourselves as a potent force in the investigation and commercial production of vitamin E, one or the other of us has, with varying degrees of belief, read every one of these papers. We have subsequently prepared an annotated bibliography of them for distribution by the National Vitamin Foundation, 149 East 78th Street, New York 21, N. Y., the fourth such we have done. If you have use for a copy, you can state your case to the Foundation.

Now that it is printed, we have at least one regret. On page 56 we see the word "preventative." Rhetoricians deplore the word "preventative."

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

Kodak
TRADE MARK

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"Cordomatic" Automatic Retracting

HANDY-LITE REEL

Pulls Out Any Length up to 20 Feet
RETRACTS AUTOMATICALLY

The "Cordomatic" Reel is the answer to the right light, where you want it —when you want it, in Home, Garage, Workshop, Patio, Basement, Service Station, Warehouse, Stock Room, Individual Plants or wherever a dependable and mobile light is required. Features easy-to-grip Neoprene handle with heavy duty steel reflector plus added outlet in handle. Swing-open guard permits instant bulb change; reinforced hanger hook. Foolproof gravity locking action has nothing to break or jam—operates exactly like a window shade—locks and releases with finger-tip control at any desired length. Heavy-duty spring motor is dust-proof and lifetime lubricated. Comes complete with 20 feet of UL Approved SV Neoprene cord featuring a kink-proof, molded-into-cord jacket which is oil and water-resistant and equipped with an adjustable Neoprene stop ball. Can be wall mounted to provide 180 degree free swivel or can be hung from ceiling to provide full 360 degree rotation. **$8.95 ppd.**

"Cordomatic" Multiple Outlet Reel

Same as above except that in place of "trouble light" you have a 3-Outlet Plug which serves as a Portable Automatic Appliance Center—handy whenever and wherever you need it! **$7.95 ppd.**

"Cordomatic" Automatic Retracting

CLOTHESLINE REEL

for Indoors and outdoors!

Completely eliminates the tangles, knots and troublesome hand winding of old-fashioned clothesline, rope or twine—ends clothesline clutter forever. With the Cordomatic you use only the amount of line you need, when you need it! White, washable plastic, guaranteed to hold up to 300 lbs., is kept taut even for the heaviest wash by the unique lock-ring. Self-storing line retracts automatically after each use—out of the way—out of sight—completely shielded from dust and grime. It's easily removed for use indoors and outdoors. Smartly styled in gleaming chrome and weather-resistant aluminum. Has 180 degree free swivel.

20 Foot	Line	$3.95 ppd.
40 Foot	Line	$6.95 ppd.

All "Cordomatic" Products Unconditionally Guaranteed Against Defective Workmanship and Materials.

Prevents Window Entry!
Warns Against Fires!

Combination BURGLAR and FIRE ALARM

Foolproof Protection for Every Window in Home or Office!

Now, in one compact, foolproof, inexpensive, battery operated unit, you have one of the most ingenious alarms ever developed! Should a burglar try to enter your home or office, the slightest disturbance of window, window shade, venetian blind or door automatically sets off a loud, howling siren that can be heard blocks away. AND, this same alarm acts as a fire detector. As soon as room temperature hits 135 degrees this same alarm thermostatically controlled, "goes off"! The real beauty of this unit is that it will last a lifetime because there is absolutely nothing to go out of order. Works on a single flashlight battery. Anyone can install it in seconds—anywhere! A single alarm can protect one or several windows and doors. Play safe—buy several! **$3.95 ppd.** (2 for $7 ppd.)

"Happy" Split-Image Transit—Revolutionary LEVEL & INCLINE MEASURE

This amazingly accurate instrument indicates level and measures incline down to a fraction of an inch. Makes bubble type or string levels obsolete. It not only indicates level, but shows exactly how much correction is needed. Just one person, using the split-image transit and target supplied with it, can perform any levelling, incline-measuring job quickly, easily, accurately. — measures inclines down to the thinness of a dime at 25 feet.

$6.95 ppd.

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Easy Heat

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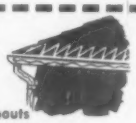

- **CHASES ICE from gutters eaves, downspouts**
- **MELTS SNOW from driveways, sidewalks . . . ELECTRICALLY!**

No more ice-jammed gutters, OR BACK BREAKING SNOW SHOVELING! Melt ice, snow electrically—from eaves, gutters, downspouts, steps—and on driveways, sidewalks as it falls! Or place on surface of snow, ice that's already fallen, see snow melt away in minutes! For built-in protection when laying new sidewalks, driveways—place cables underneath concrete or asphalt. Other uses: keeps engine warm in unheated garage. Floor heating in kennels, soil heating in gardens. Prevents trailer plumbing, water in animal troughs from freezing. Kit contains looped strand of extra heavy vinyl covered heater wire, UL approved lead wire and moulded plug. Instructions.

3 ft.	$ .95	24 ft.	$3.65
6 ft.	$1.70	30 ft.	$5.60
12 ft.	$2.50	40 ft.	$6.85
18 ft.	$2.75	60 ft.	$8.95

Easy Heat HEAT TAPE

Protects WATER PIPES above or below ground AGAINST FREEZEUPS!

Easy Heat Heat Tape acts like an "electric blanket" to keep water pipes warm, safe from freezing, bursting! Pipes stay warm all over, because heat's distributed evenly along entire length of pipe. Installs in minutes, protects pipes all winter! Twin insulated heat cables run entire length of tape, end in lead wire and plug. Just wrap tape around pipe, cover with heavy-duty outer covering, fasten with gummed vinyl tape. That's all! Then just plug in lead wire to any AC-DC outlet on days when temp. nears freezing. Unplug on warmer days! Also protects house trailer plumbing, water pumps, etc! You get: heat tape with twin attached cables, waterproof, vermin-proof insulating wrap, gummed vinyl tape, instructions.

With Built-in Thermostat

3 ft.	$2.25	3 ft.	$4.75
6 ft.	$2.95	6 ft.	$5.45
12 ft.	$3.95	12 ft.	$6.45
18 ft.	$4.95	18 ft.	$7.45
24 ft.	$5.75	24 ft.	$8.25

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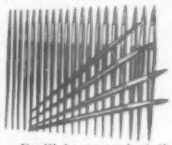

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Superb quality brushes for every conceivable need from fine line work to broad brush strokes. You'll be amazed at the soft yet firm texture of these select brushes, each solidly set in metal grip to give years of use. Perfect for artwork, architects, touching up around the house, cleaning electrical and optical instruments and more.

24 Brushes—2 ea. of nos. 1 thru 12— $2.00 ppd.

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Windproof, Waterproof, Flameless, Fuel-Less Pocket Size

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Lights Every Cigarette Under the Sun—Wind can't blow it out.

The most practical outdoor cigarette lighter ever created! A precision instrument that utilizes the power of the sun to light your cigarette. Forget about fuels, matches, wicks, danger of fire. Merely insert a cigarette in scientifically designed parabolic pocket-sized reflector and in just a few seconds your cigarette is lit. NO PUFFING IS REQUIRED! Perfect for all outdoors—camping, fishing, beach and boats. Guaranteed to amaze and amuse you—and your friends! Also works thru sunny windows indoors. **$1.00 ppd. (3 for $2.75)**

Now! Shut Out Cold, Wind, Water, Snow . . . Keep Garage Warm and Dry ALL WINTER with . . . FLEXIBLE RUBBER GARAGE DOOR BOTTOM

Don't waste precious heating dollars! Keep winter cold, snow, rain, dust and drafts out—keep heat in with this amazing heavy-duty, live rubber weather-stripping. Ingenious front and back lip contour design makes it an automatically perfect closure regardless of shape of floor. Guaranteed never to harden, rot or deteriorate in any fashion. Eliminates forever ear-shattering noises no matter how hard you slam down your overhead garage door. Ideal also for bottoms of double hung garage doors, barn doors, etc. Can be permanently applied in only 10 minutes—requiring just a hammer—we supply the nails. Complete, simple instructions in plastic pack.

9 foot strip.....$2.89 ppd.
18 foot strip.....$4.98 ppd.

Automatic Siphon Pump

sensational low price **$1.98 ppd.**

Now—siphon any liquid automatically, safely. WITHOUT putting tube to mouth! Squeeze bulb, liquid starts to flow immediately! Transparent sections let you see liquid flowing! Siphons, pumps gasoline, water, any liquid. Even acids, corrosives! For cars, boats, power mowers, campers, plumbers, doctors, chemists, factories! Acid resistant. Over 7 ft. long!

ALSO AVAILABLE—Heavy Duty Siphon—1½" dia. tubing, 8 ft. long .....$2.98 pp.

Water ON or OFF at SAME TEMPERATURE — SAME PRESSURE with Elgin

SHOWER ECONOMIZER

Saves Water, Fuel, Money!

Set your shower to temperature and pressure desired—then shut it off by a slight tug of the "Economizer" chain. After you're all soaped up, another gentle tug of the chain restores the EXACT same temperature and pressure as before! Fits all showers, screws on in a minute. Made of solid brass—heavy chrome plated. Unconditionally guaranteed for 2 years—precision made to last a lifetime! Perfect for homes, resorts, schools, hotels, motels, apartment houses, institutions, trailers **$3.95**

plus 35c pp. & hdlg.
3 for $10.85— plus 50c pp. & hdlg.)

Drills and Saws Any Shape! Supreme HOLE SAW

$1.00 ppd.

Simply insert the amazing Drilsaw into the chuck of your ¼" electric drill and you're ready to cut any shape you desire. Lower portion of Drilsaw acts as regular ¼" drill which easily bores thru wood, plaster, plastics, plywood and similar materials. Then, after penetration, the keen cutting edges of the Drilsaw, cleanly and speedily cut in any direction you move. Cut circles, triangles, zig-zags, any conceivable shape you wish—in seconds!

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Dept. 2401—415 South Broadway, Yonkers, N. Y.

How to save 77 years

The boy Galileo sat in the sanctuary of Pisa's great cathedral, observing the movement of a lamp which had been set swinging by a sudden gusty draft. The chain by which it was suspended from the high ceiling was of such a length that the arcs decreased but slowly. Strange thing, though. No matter how far the pendulum swung, its movement consumed the same time. Galileo made a note of that. The year was 1581.

The old man sat at his writing desk, sixty years and a thousand disputes later, writing down a new theory. The regularity of a swinging pendulum might be combined with a spring mechanism to improve the unreliable clocks of that day. So Galileo scribbled on, and did nothing more about it. A number of years after his death Huygens took the notes and invented the pendulum clock. *Seventy-seven years had elapsed since the boy made the observation upon which it was based!*

The creative thinker today still need not have a specific use in mind when, by equation or formula, he branches off from the accepted to the hitherto unknown. The classic invention of this decade, the transistor, evolved in the Bell Telephone Laboratories as scientists sought a deeper understanding of semiconductors. On the other hand, another great invention, the feedback amplifier, came from the acutely creative mind of one Bell engineer faced with a specific problem.

Current Bell Laboratories activities—in such areas as data transmission, radar and submarine cable development—call for the coordinated efforts of all types of thinkers and all types of approaches. One type complements another.

Today, seventy-seven years would not have elapsed between the swinging lamp and the swinging clock pendulum—certainly not at Bell Labs, where ideas, though not rushed, are carefully advanced toward fruitful application in national defense, industry and communications. An important part of this harvest is the efficiency of America's telephone service, unequalled anywhere else in the world.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

• New Machines and Gadgets •

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REFLECTING TELESCOPE offers 45-power magnification for viewing moon craters and mountains in detail. The inexpensive portable unit is 36 inches high on removable 18-inch legs, and has a three-inch-diameter, 20-inch-focal-length, aluminized mirror and Ramsden eyepiece. An 18-page instruction booklet comes with it.

Science News Letter, January 3, 1959

LIGHTWEIGHT SPORTING RIFLE, 30-caliber, weighs 6½ pounds but packs a heavyweight punch with high accuracy. Made of strong, high-quality Swedish steel, the rifle has an improved self-cocking action and a sleek, clean design.

Science News Letter, January 3, 1959

SELF-ADJUSTING FLOODLIGHTS for outdoor use make any type of reflector lamp last longer in lighting home gardens, parking lots, etc. A full-floating socket insures a weatherseal and a cushion-spring cradle adjusts to different lamp shapes to minimize common causes of early lamp failure. The lights are made for medium or mogul base reflector lamps in 70- to 500-watt sizes.

Science News Letter, January 3, 1959

SYNTHETIC CHAMOIS CLOTH of nitrile rubber and nylon is not harmed by

grease, oil or solvents. For use around the home or in industry, the imported cloth, shown in the photograph, can be laundered without harm and can be stored damp or dry. It cleans glass, woodwork, furniture, walls and autos.

Science News Letter, January 3, 1959

AUTOMOBILE VENTILATOR is a synthetic rubber sleeve inserted in the top window channel and the glass then rolled up. It prevents window frosting and steaming, draws out smoke and fumes, and acts as a pressure reliever for easy door closing.

Science News Letter, January 3, 1959

PARTY GOBLETS, for decorating cakes, are tiny goblet-shaped, clear-plastic containers pointed at the bottom so they may be stuck into the top of a cake. In addition to providing "short toasts," the miniature goblets can be used to hold birthday candles.

Science News Letter, January 3, 1959

FIVE-IN-ONE SAW resembles a kitchen hand mixer in size and shape, but offers the features of rip, band, keyhole, hack and scroll saws for working metal, two-inch lumber, plywood, plastics or leather. Special bevel quadrants permit tilting of the saw shoe, and a chip blower improves vision and reduces blade drag.

Science News Letter, January 3, 1959

HEAVY END ALUMINUM PIPE offers increased strength and thickness at pipe ends where welded or threaded joints are made, and uses less metal in the pipe body. Manufactured by a new extrusion method, it is lightweight and works with standard fittings.

Science News Letter, January 3, 1959

Nature Ramblings

By HORACE LOFTIN

➤ TO SAY the least, you would probably be rather surprised to find a dinosaur in the neighboring woods. Well, something very much like this occurred in South Africa in 1938. A fisherman hauled in a very odd fish in his seine which was turned over to experts for identification.

The find literally shook the scientific world, for it was a fish representing a group that was supposed to have been extinct for more than 100,000,000 years. Since that time, other examples of this living fossil have turned up in African waters, especially near Madagascar.

What was especially exciting to scientists about this discovery was that the fish, a coelacanth, was of the kind from which the land animals with backbones are supposed to have originated. Many of its features, including bony, lobed fins reminiscent of the limbs of terrestrial animals, suggested this was the fish that first ventured on land

A Double Life

to stay, giving rise eventually to the amphibians, reptiles, birds and mammals.

The transition from life on water to land was not a quick or easy process. Indeed, the living examples of the first great experiment still lead a "double life," spending most of their time on moist land, but returning to water for reproduction and rearing of the young. These "experimental animals" are the amphibians, including the toads, frogs and salamanders.

In both structure and way of life, the amphibians stand between the wholly aquatic fishes and the wholly terrestrial reptiles. They are the first of the backboned animals with true, bony limbs for crawling, but these legs are relatively weak. The typical adult amphibian has lungs or other means for breathing air, though the young are still equipped with gills. Most of the species are able to spend a majority of their life on land. Their lack of a suitable protective skin covering makes them susceptible to drying out, however, and they are restricted to moist environments.

The "transient" nature of the amphibians, representing a step between fishes and higher vertebrates, can be seen in their relative lack of success as a group.

There are probably only 2,500 living species of amphibians, compared to ten times that many fishes and more than twice as many reptiles. Still, in their quiet, secretive way, they have managed to survive for many, many millions of years.

Science News Letter, January 3, 1959